

# ***Interactive comment on “Tracing the sources of dissolved organic carbon occurring in a coastal bay surrounded by heavily industrialized cities using stable carbon isotopes” by Shin-Ah Lee et al.***

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Interactive comment on “Tracing the sources of dissolved organic carbon occurring in a coastal bay surrounded by heavily industrialized cities using stable carbon isotopes” by Shin-Ah Lee et al. Lee and Guebuem Kim Anonymous Referee #1

Major comments This manuscript by Lee et al set out to investigate the sources of dissolved organic matter in a coastal bay surrounded by heavily industrialized cities, Masan Bay, Korea, during two different sampling trips in 2011 and 2016. The authors

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measured DOC, DON, chromophoric-DOM and stable carbon isotope composition in related samples. They found that the excess DOC was observed in higher-salinity waters (16-21) during 2011, with higher concentrations of protein-like FDOM and lower DOC/DON ratios. In 2016, however, the high DOC waters in high-salinity waters were characterized by low FDOM, more depleted  $\delta^{13}\text{C}$  values and high C/N ratios. In general, this is a fairly well written manuscript presenting data on the source changes in DOC and CDOM in a coastal environment during two different sampling years. Overall, it is concise manuscript. Their approach is straightforward and conclusions are based on what the authors observed. Contents presented here are suitable for the journal of bg. I support eventual publication of this manuscript. Having said that this manuscript needs revisions before acceptance.

=> Thank you for the positive and valuable comments.

First of all, their two samplings in the same study area are over 5 years apart (2011-2016) without other sampling point. In addition, DOC abundances do not vary consistently or significantly with salinity (Fig 4a) although FDOM-H does (Figure 4c). It is very difficult to judge these DOC data since they are from a coastal bay influenced heavily by industrialized. Additional explanation will be helpful.

=> Yes, we will include more explanation on oceanographic changes over different sampling years in the revised version. We use these multiple tracers in order to determine the main sources amongst such inconsistent and dynamic sources in this region. We could not find any measurable sources from potential industry and STP sources based on our tracers.

Second, the authors presented results from PARAFAC analysis in several places (see also Figure 4) and the FDOM composition differences between two samplings. However, there are not additional information related to these analyses, neither component contours nor excitation/emission loadings. The PARAFAC-derived DOM components should be provided along with their detailed and specific Ex/Em values (can be in sup-

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plemental if needed).

=> The component contours and excitation/emission loadings will be added in the supplementary section.

Third, Specific goals and scientific questions should be added into the Introduction section. Otherwise, it does not look like a

=> We will more clearly describe specific goals and scientific questions in the revised version.

Fourth, are there any additional parameters/evidence to support the industrial pollution or excess DOC during sampling? Similar to  $\delta^{13}\text{C}$  values, specific C/N ratios should be provided in the abstract so that the reader can easily compare data between different sampling years.

=> As mentioned above, we could not find any sources from industries and STP based on  $\delta^{13}\text{C}$ -DOC, FDOM, and C/N ratio tracers, although we suspected such source inputs before this study was conducted. We will add specific C/N ratio values in the abstract.

Lastly, similar to DOC concentrations,  $\delta^{13}\text{C}$  values in 2016 are somewhat highly variable within small salinity range. What are the possible reasons causing this abrupt change? FDOM, on the other hand, seemed to vary consistently with salinity. Then, the question is that are FDOM nor related to the bulk DOC in the study area or from polluted DOC sources?

=> Yes, this is an important finding of our study. We found increased DOC concentrations at stations showing decreased  $\delta^{13}\text{C}$ -DOC values. This is attributed to artificial island-seawater interactions in addition to terrestrial source inputs from small streams. We will add more information on the artificial island constructed during 2015-16 and the interpretation of this terrestrial source. The good correlations between salinities and FDOM (humic), relative to DOC, are commonly observed since freshwater is the

dominant source for FDOM (humic). However, there is significant marine DOC source (without adding humic FDOM) in the ocean. So, this decoupling is a common phenomenon in coastal waters.

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